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Annapolis Water Reclamation Facility Odor Control Projects Update

Capital Projects X764281 & S802389

December 17, 2024

Introductions

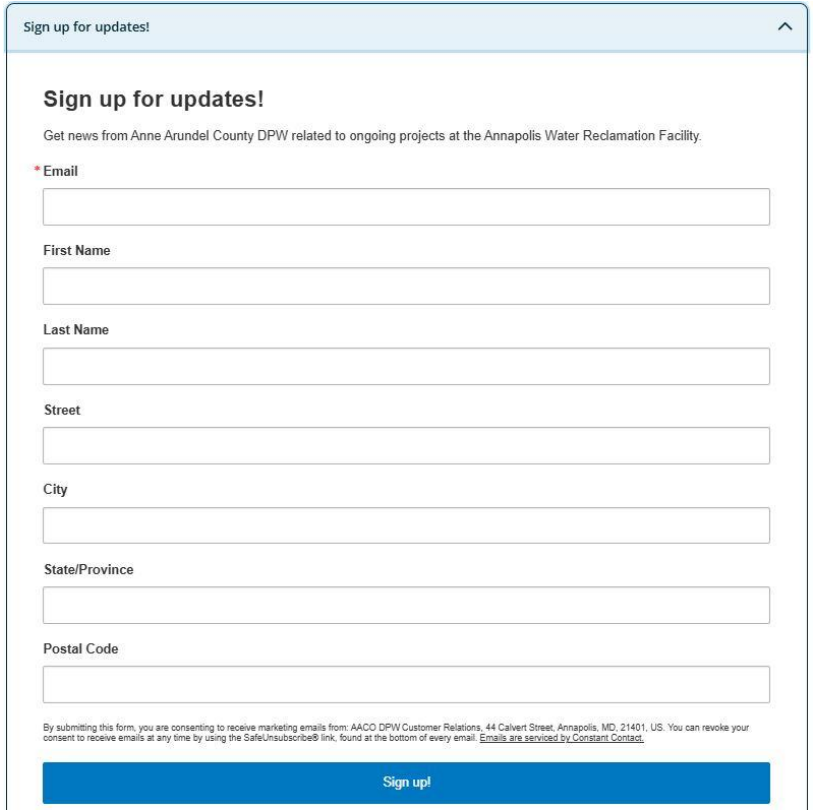
Meeting Outline

- Phase II Upgrade Project progress update
- Annapolis WRF Website Update
- Odor Control Project Goals & Progress
- Summary of Monitoring Results
- Dispersion Modeling
- Estimated Schedule
- Questions?

Annapolis WRF Website Updates

Annapolis WRF Update webpage:

http://aacounty.org/annapolisWRFOdor



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Capital Project Goals (X764281)

- Monitor air quality at individual processes to identify and prioritize needs
- Determine level of odor control needed at each process
- Evaluate and develop improvements to existing operational processes to minimize odors
- Establish scope and cost for the design/construction project

Capital Project Goals (S802389)

- Provide continuous monitoring within the surrounding community through end of construction
  - A monthly report will be posted on the Annapolis WRF website
  - Currently working through County Procurement to provide this
- Design the needed improvements needed for the odor control
  - Odor units shall treat odorous gases using best available technologies

Odor Control Project Progress

- Summer monitoring was completed from July through August
- Grit/screen scrubber purchase order has been obtained and repair parts are scheduled to be shipped mid-March 2025
- Design kick-off meeting held for the Annapolis WRF Odor Improvements project
    - This project will include the construction and replacement of the odor control systems needed based on the monitoring results
    - Areas of focus are the influent pumping station, grit/screen building, primary clarifiers and gravity sludge thickeners

Denitrification Mudwell Update

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Summary of Monitoring Results

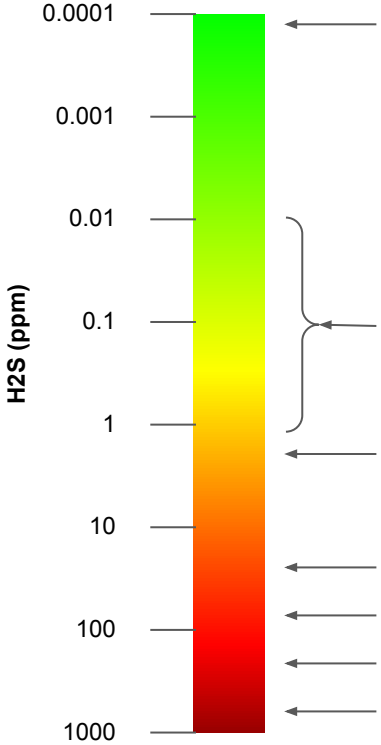
Hydrogen Sulfide (H_2S) Air Monitoring

Monitors placed within the plant facility at the plant processes measure H_2S in Parts per Million (ppm)

Higher sensitivity monitors placed along the plant fence line and in the community measure H_2S in Parts per Billion (ppb)

Hydrogen Sulfide Hazards

https://www.osha.gov/hydrogen-sulfide/hazards



0.00011 - 0.00033 ppm	• Typical background concentrations
0.01 - 1.5 ppm	• Odor threshold (when rotten egg smell becomes noticeable)
2 - 5 ppm	• Odor becomes more offensive • Prolonged exposure can cause nausea • Airway problems can occur in some asthmatic patients
20 ppm	• Possible fatigue, loss of appetite, headache, irritability, poor memory, dizziness
50-100 ppm	• Odor becomes sweet, conjunctivitis, respiratory irritation
100-150 ppm	• Loss of smell, altered breathing, throat irritation, death may occur after 48 hours
500-700 ppm	• Collapse, damage to eyes, death after 30-60 minutes

Smell My City Reporting Map

Scatter plot showing the locations of individual complaints (same data shown differently)

Summer Monitoring Map

- **17 loggers** deployed
  - 9 ppm monitors
  - 8 ppb monitors, includes 5 in surrounding community
- Monitoring duration: **July through August**

Legend:

Locations within WRF (PPM)

1. Wet well (Influent & Effluent (2))
2. Headworks (Building Space & Effluent (2))
3. Primary Clarifier Launders
4. Odor Control to Blowers
5. Gravity Sludge Thickeners
6. Solids Facility
7. Denite Filters Mudwell

Fenceline locations (PPB)

1. Septic Hauler Discharge/West
2. South
3. Denite Filter Backwash Area / North

Neighborhood Locations (PPB)

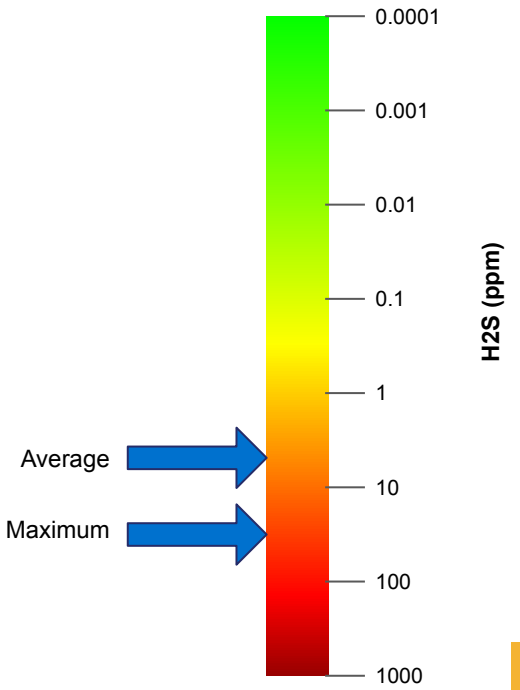
1. Marina- Store Front
2. Marina- Fenceline
3. Maritime Museum
4. Chesapeake Harbor - Near pool/tennis courts
5. Chesapeake Harbor along roadway - East

Differences in Sources Monitored

- Controlled Sources - ventilated through additional odor control treatment
  - Influent pump station (before odor treatment)
  - Primary clarifier launders
  - Gravity sludge thickeners
- Uncontrolled sources - ventilated to atmosphere
  - Influent pump station (after odor treatment)
  - Screen and grit building (after odor treatment)
  - Solids building (after odor treatment)
  - Mudwell
- Fence Line/neighborhood monitors - direct impact to community

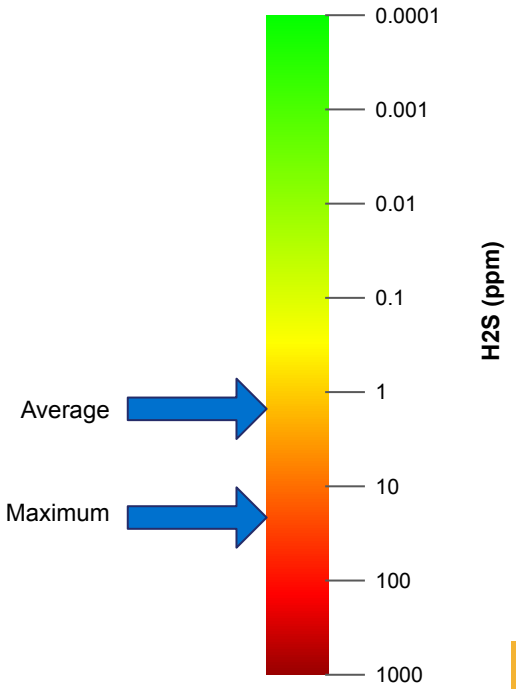
Summary of Summer Monitoring Results, Plant Process Monitors - *Controlled* Sources

Location	Average (ppm)	Highest Reading (ppm)
Influent Pump Station (Influent)	5.1	36.7
Primary Clarifiers	4.5	37.7
Odor Control Blowers	12.1	37.2
Gravity Sludge Thickeners	3.4	39.2



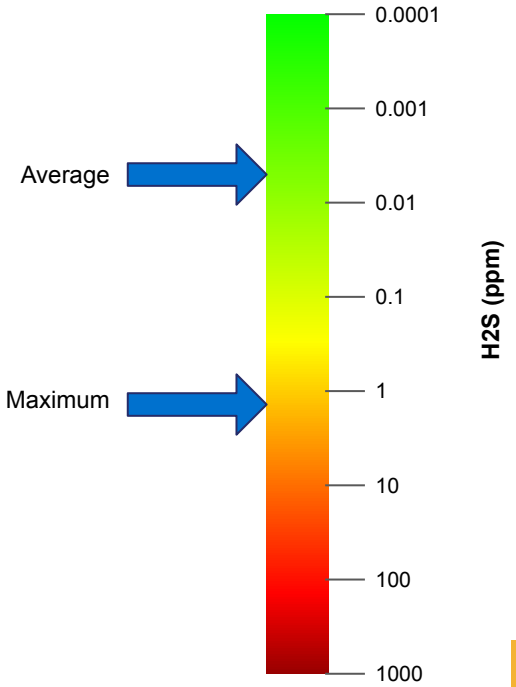
Summary of Summer Monitoring Results, Plant Process Monitors - *Uncontrolled* Sources

Location	Average (ppm)	Highest Reading (ppm)
Influent Pump Station (Effluent)	1.2	15.3
Screen & Grit Building (Exhaust)	1.5	12.5
Mudwell	0.2	60
Solids Facility Odor Control Unit	0	0.0



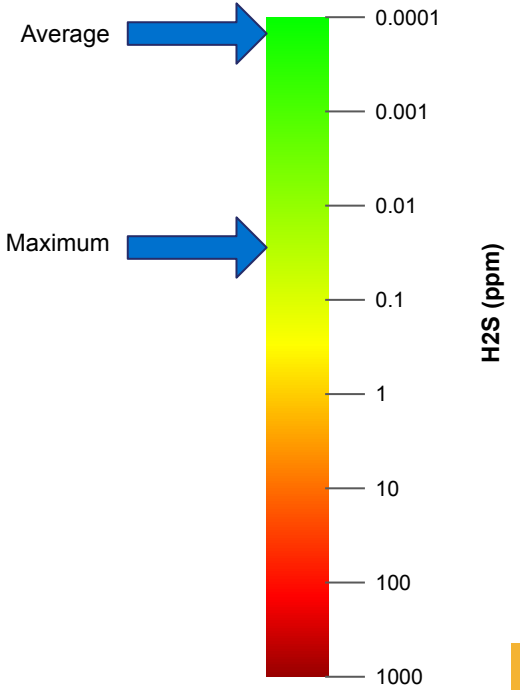
Summary of Summer Monitoring Results - *Fence Line Monitors*

Location	Average (ppm)	Highest Reading (ppm)
Septic Area	0.008	2.5
South	0.008	0.7
North	0.002	0.1



Summary of Summer Monitoring Results - *Neighborhood Monitors*

Location	Average (ppm)	Highest Reading (ppm)
Marina (Storefront)	0.0004	0.048
Marina (Fence)	0.0003	0.041
Chesapeake Harbor (Road)	0.0001	0.020
Chesapeake Harbor (Pool)	0.0002	0.061
Maritime Museum	0.0001	0.016



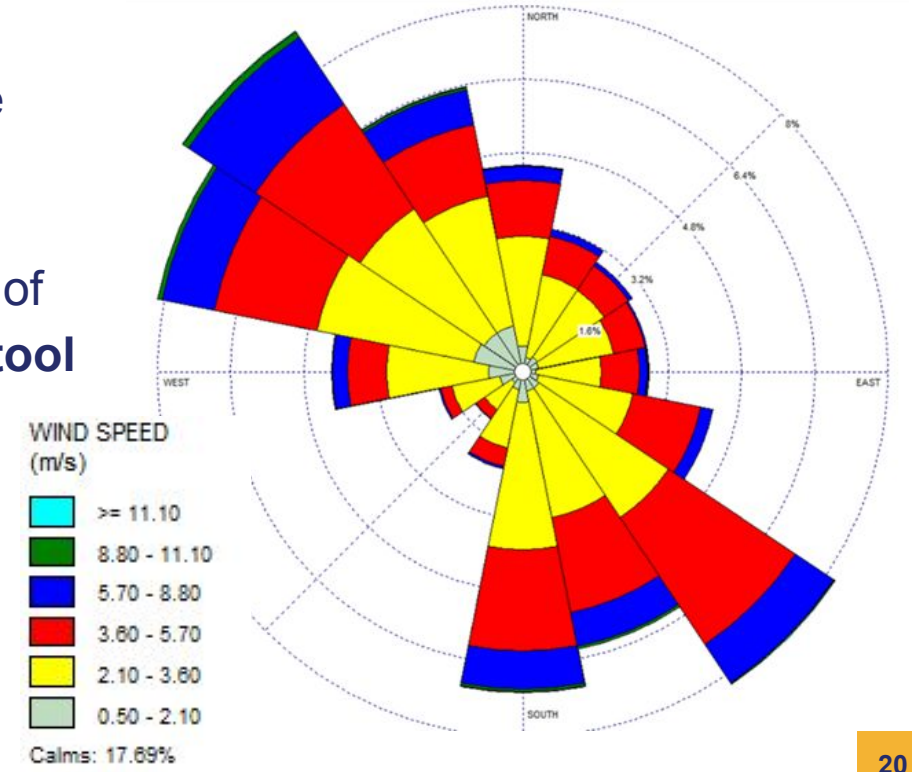
Summary of Monitoring Data

- Source monitors (ppm) sense hydrogen sulfide continuously, but fence line and neighborhood monitors sense hydrogen sulfide intermittently
- We looked at data to identify if there was a correlation
  - No strong correlation can be made between source monitors and fence line/neighborhood monitors
  - Slight correlation between screen and grit building and fence line/neighborhood
- Data confirms, however, that influent pump station, grit and screen building, and mudwell are all sources that could benefit from improved odor control

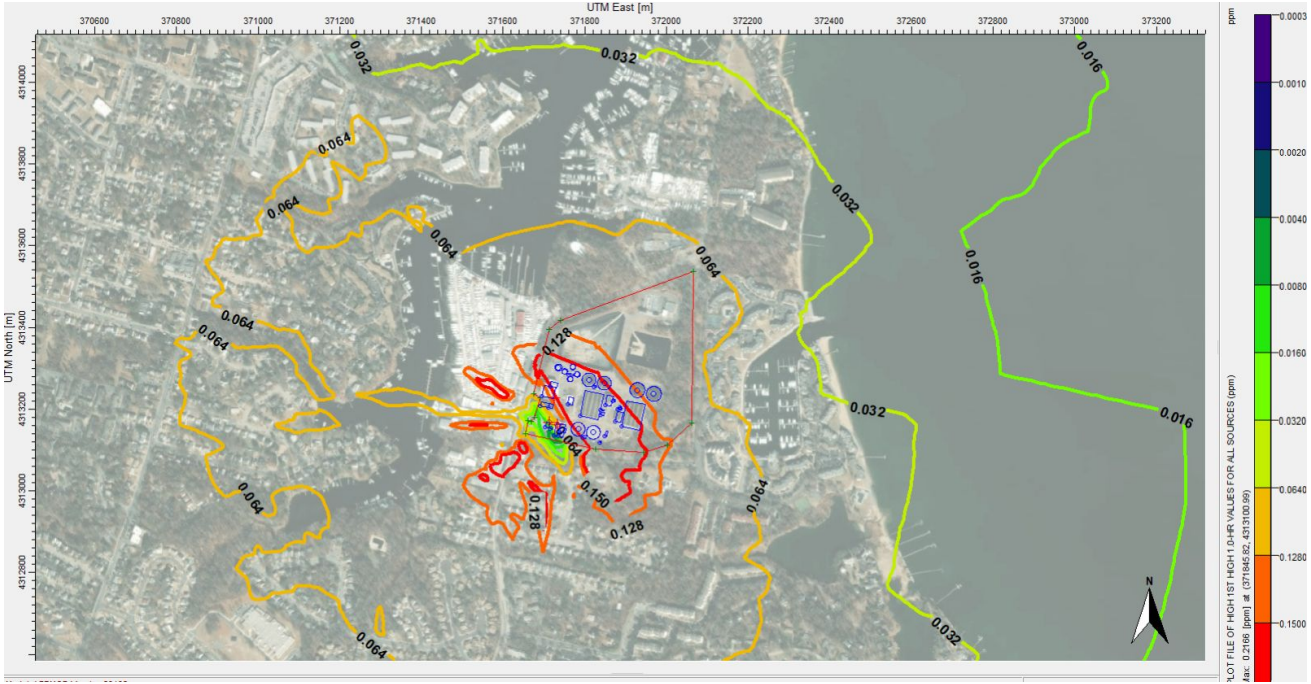
Dispersion Modeling

- Odor levels in the neighborhood are highly influenced by weather - temperature, pressure, and wind
- Used for evaluating effectiveness of improved treatment - **model is a tool based on input data**. Actual conditions may differ.
- Based on 3-years of actual meteorological data

Wind Rose - Annapolis



High Screen and Grit Concentration (20 ppm) Maximum 1 hour H_2S concentration



Highest modeled concentration offsite **= 0.22 ppm**

Within limits of detection for “rotten egg” odor but below threshold (2 ppm) for offensive odor, prolonged exposure causes nausea, etc.

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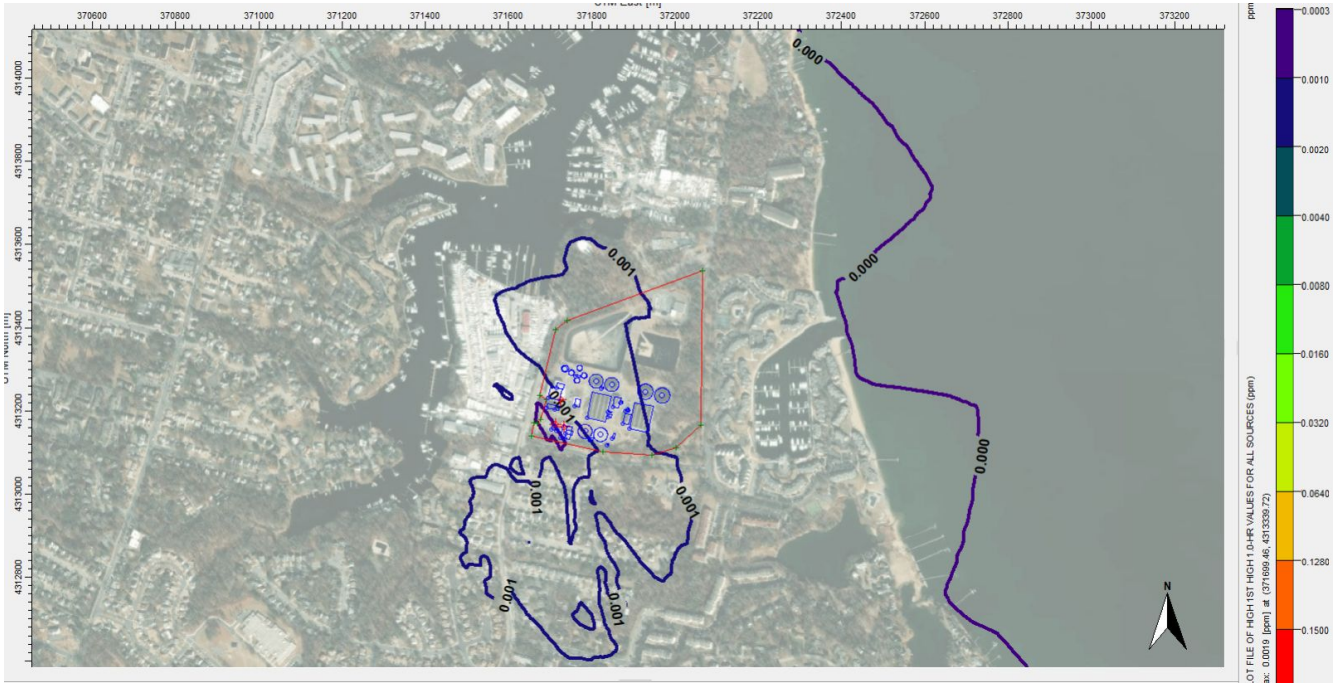
All Sources Controlled (0.1 ppm) Maximum 1 hour H_2S concentration



Highest modeled concentration
= 0.002 ppm

Below detection of "rotten egg" smell

Dispersion Modeling Conclusions

- Modeled sources can have impacts on surrounding communities if odors not controlled
- Improved treatment can reduce impact on surrounding communities from those sources
- Recommend new odor control systems for:
  - Influent pump station
  - Screen and grit building

Next Steps

- Initiate continuous monitoring plan through construction period
  - Current monitors need to be recalibrated
  - Monthly summary of results will be posted on Annapolis WRF webpage
- Industrial hygienist will review the monitoring data and provide assessment
  - Will also include a review from a toxicologist and an epidemiologist
- Finish design of denitrification mudwell and contract through onsite contractor to install odor control system

Anticipated Schedule

Task	Timeframe
Preliminary Design	November 2024 - February 2025
Start Mudwell Construction	Late Spring / Early Summer 2025
Detailed Design	February 2025 - Fall 2025
Start Bidding & Award Process	Late 2025
Start Construction	Summer 2026
Finish Construction	Late 2027 / Early 2028

Questions

Contact Information

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Annapolis WRF Update webpage:

http://aacounty.org/annapolisWRFOdor